

Notes 9/24 - Working with Radicals

- Radical is a root $\sqrt{\quad}$ square root, $\sqrt[3]{\quad}$ cube root, $\sqrt[4]{\quad}$ 4th root, $\sqrt[n]{\quad}$ nth root

- Radicals undo exponents

Ex: $\sqrt{\sqrt{2^2}} = 2$ $\sqrt[3]{2^3} = 2$

- Radicals are fractional exponents

$\sqrt{r^1} = r^{\frac{1}{2}}$ inside exponent \rightarrow top
root \rightarrow bottom

$\sqrt[3]{5^1} = 5^{\frac{1}{3}}$ $\sqrt[6]{a^5} = a^{\frac{5}{6}}$

Solving Equations with Radicals

Ex: $(\sqrt{n-3})^2 = (4)^2$

$$\begin{array}{r} n-3 = 16 \\ +3 \quad +3 \end{array}$$

$n = 19$

Check:
 $\sqrt{19-3} = \sqrt{16} = 4 \checkmark$

Ex: $2\sqrt[3]{x} + 1 = 7$
-1 -1

$$\frac{2\sqrt[3]{x}}{2} = \frac{6}{2}$$

$$(\sqrt[3]{x})^3 = (3)^3$$

$$x = 3^3 = 27$$

Even
exponents

$$(\quad)^2 = + \quad (\quad)^4 = + \quad (\quad)^{\text{even}} = \text{positive}$$

Odd
exponents

$$\begin{aligned} (+)^3 &= + \\ (-)^3 &= - \end{aligned}$$

> Can have both positive and negative answers

\Rightarrow Can't take an even root ($\sqrt{\quad}$, $\sqrt[4]{\quad}$, $\sqrt[2n]{\quad}$)
of a negative number

BUT I can take an odd root of a negative

$$\text{even}\sqrt{\quad} = \text{negative} \Rightarrow \text{no real solution}$$

$$\text{odd}\sqrt{\quad} = \text{negative} \Rightarrow \text{solve it!}$$

■ Using Radicals to Solve Equations

Ex:

$$\begin{array}{r} x^2 + 4 = 20 \\ -4 \quad -4 \\ \hline \end{array}$$

$$\sqrt{x^2} = \sqrt{16}$$

$$x = \pm 4$$

• Whenever you have an even exponent and you undo it, add the \pm in front of your answer.

Ex:
$$\begin{array}{r} 2x^3 - 1 = 127 \\ +1 \quad +1 \end{array}$$

$$\frac{2x^3}{2} = \frac{128}{2}$$

$$\sqrt[3]{x^3} = \sqrt[3]{64}$$

$$x = 4$$

Finding Roots on Calc

MATH button

Cube root 4: $\sqrt[3]{}$

For roots bigger than 3

1. number of root
2. Math
3. 5: $x\sqrt{}$
4. number you're taking root of